



PATENT
Attorney Docket No. KOT-0014

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
Chika HONDA et al.) Group Art Unit: 2876
Serial No.: 09/616,608) Examiner:
Filed: July 14, 2000) Craig E. CHURCH
For: X-ray image radiographing)
method and radiographing)
apparatus)
Assistant Commissioner for Patents
Washington, D.C. 20231

DECLARATION

Sir:

1. I, Chika Honda declare and state as follows:

That I was awarded a Doctor's degree in Industrial Chemistry of Kyoto University in March 1978. Since April 1978, I have been employed by Konishiroku Photo Industry Co. Ltd, now Konica Minolta M&G Inc. During my employment, I have been engaged in the research and development center in the field of radiography.

That I am one of the coinventors of the present application and am familiar with the subject matter of the present invention. I have read and understand the Office Action of July 11, 2003.

2. What follows are the test results of comparative tests conducted in accordance with my detailed instructions under my supervision.

3. As illustrated in attached Fig. 1, as objects to be radiographed, two resin screws, a circular resin column including bubbles and a cylindrical resin tube were prepared.

These objects were radiographed under the following conditions:

X-ray source

Type: a rotating anode type X-ray tube "Rotor-anode DRX-B1146B-Mo" manufactured by Toshiba

Tube voltage: 28 kVp

Size of focal spot: 100 μ m

X-ray detector

Mammography film CMH and intensifying screen M-100 manufactured by Konica (After radiographing, the film was processed for 90 seconds at a temperature of 34 °C by the automatic processing machine SRX-502)

Radiography arrangement

The X-ray tube was arranged to be horizontal so as to emit X-rays in a direction parallel to the ground and the objects were placed at distances R1 (cm) and R2 (cm) so as to conduct radiographing with magnification M, where R1 is the distance between the X-ray tube and the object, and R2 is the distance between the object and X-ray detector, as recited in the claim.

	R1	R2	M
Comparative Example I	76	0	1
Comparative Example II	38	38	2
Inventive Example	47	47	2

The arrangement of Comparative Example I was determined in accordance with the method of the reference of Coe. Therefore, Comparative example I represents the reference of Coe.

The arrangement of Comparative II was determined to obtain the magnification 2 recommended by Wolbarst in the distance 76 (cm) of Coe. Therefore, Comparative Example II represents a combination of Wolbarst and Coe.

The arrangement of Inventive Example was determined to obtain the magnification 2 recommended by Wolbarst in such a manner that firstly, R1 was determined to be 47 (cm) in accordance with the size of focal spot of 100 μm by the formula recited in the claim and secondly, R2 was determined to be 47 (cm) to obtain the magnification 2. Therefore, Inventive Example represents the present invention.

4. Test Results

The test results are shown in attached photographs of Comparative Example I, Comparative Example II and Inventive Example.

As can be seen from the comparison between Comparative Example I and Comparative Example II, by magnification radiography, a more detailed examination can be conducted by Comparative Example II than Comparative Example I. However, as Wolbarst explicitly teaches, the unsharpness of the image due to penumbra increases in Comparative Example II.

In contrast, as can be seen from the comparison between Comparative Example II and Inventive Example,

especially from the comparison of edge portions of the contours indicated with reference marks "a" to "d" in Fig. 1, the edge portions of contours of the objects in Inventive Example becomes clearer with high sharpness than Comparative Example II.

Namely, in Comparative Example II, R1 of 38 (cm) was merely determined to obtain the magnification 2 in the distance 76 (cm) of Coe. As a result, since R1 of 38 (cm) did not satisfy the formula recited in the claim, a proper edge enhancement was not obtained in Comparative Example II.

In Inventive Example, R1 of 47 was determined in accordance with the size of focal spot of 100 μm by the formula recited in the claim. As a result, a proper edge enhancement was obtained in Inventive Example.

5. Conclusion

As stated in Test Results, the radiographing method of the present invention can solve the problem of the unsharpness due to penumbra caused by magnification mammography.

Therefore, according to the radiographing method of the present invention, a more detailed examination can be conducted by magnification mammography without causing unsharpness. This unexpected result is evidence of the unobviousness of the present invention.

6. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001, of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issued thereon.

Dated: *November 4, 2003*



Chika HONDA

Annex:

Fig. 1
Photographs of
Comparative Example I
Comparative Example II
Inventive Example